

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference DC5146PCT1	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US 03/23601	International filing date (day/month/year) 28.07.2003	Priority date (day/month/year) 28.07.2003
International Patent Classification (IPC) or both national classification and IPC G03F7/42		
Applicant DOW CORNING CORPORATION		



- This International preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 7 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 25.02.2005	Date of completion of this report 08.11.2005
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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/US 03/23601**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*

Description, Pages

1-17 as originally filed

Claims, Numbers

1-10 received on 28.07.2005 with letter of 28.07.2005

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-10
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-10
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item I

Basis of the report

(1) Claim 1, as filed with the letter dated 28/07/2005, relates to a method according to claim 1 as filed according to Article 19(1) PCT, wherein the removing step (vi) is further defined by the expression ***"using an etching solution"***.

However, it is clear from the present description that said etching solution **always** comprises an organic solvent and a base (see paragraphs 45, 57-63 of the present description; see also claim 5 as originally filed).

Since the content of claim 1 is not directly and unambiguously derivable from the present application, said claim introduces subject-matter which extends beyond the content of the international application as filed, contrary to Article 19(2) PCT.

Consequently, the phrase ***"using an etching solution"*** in present claim 1 has not been taken into account for establishing the present examination report.

(2) The same remark as in paragraph 1 of this section applies to newly filed independent claim 2. Consequently, the phrase ***"using an etching solution"*** in present claim 2 has not been taken into account.

(3) Newly filed dependent claim 9 cannot refer to independent claims 1 and 2 because in the latter claims the etching solution is not yet defined as comprising a solvent. However, in the light of paragraph 45 of the present description it has been considered that claim 9 was referring to dependent claim 4 where it is defined that the etching solution comprises an organic solvent and a base.

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following documents:

D1: US 2002/0158317 A

D2: US 5 854 302 A

(1) The present application does not satisfy the criterion set forth in Article 33(3) PCT because the subject-matter of claims 1-10 does not involve an inventive step:

Document US 2002/0158317 A (D1) discloses a method for producing a silicone patterns on a substrate, which method comprises:

- (i) applying a photopatternable silicone composition to the surface of a substrate (silicon wafer), which composition comprises (a) an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule, (b) an organosilicon compound containing an average of at least two silicon-bonded hydrogen atoms per molecule, and (c) a catalytic amount of a photoactivated hydrosilylation catalyst;
- (ii) selectively exposing the film to radiation to produce a partially exposed film having non-exposed regions covering at least a portion of the surface and exposed regions covering the remainder of the surface;
- (iii) heating the exposed film for an amount of time such that the exposed regions are substantially insoluble in a developing solvent and the non-exposed regions are soluble in the developing solvent;
- (iv) removing the non-exposed regions of the heated film with the developing solvent to form a patterned film; and
- (v) heating the patterned film.

The subject-matter of present claim 1 only differs from D1 in that the present method comprises a further step consisting in **removing all or a portion of the product of step (v)**.

The problem to be solved by the present invention may be regarded as providing a **method for recycling a substrate on which a defective patterned silicone layer has been formed** (see page 1, lines 24-27, of the present application).

Document US 5 854 302 A (D2) discloses a method for producing (see column 25) and

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stripping a silicone patterns from a substrate, which method comprises:

- (i) applying a photopatternable silicone composition to the surface of a substrate (silicon wafer), which composition comprises (a) a partially polymerized 1,3-bis(2-bicyclo[4.2.0]-octa-1,3,5-trien-3-ylethenyl)-1,1,3,3-tetramethyldisiloxane (DVS), (b) 2,6-di(4-azido benzylidene)-4-methylcyclohexanone as a photosensitive agent, and (c) a solvent.
- (ii) selectively exposing the film to radiation to produce a partially exposed film having non-exposed regions covering at least a portion of the surface and exposed regions covering the remainder of the surface (see column 25, lines 18-21);
- (iii) heating the exposed film for an amount of time such that the exposed regions are substantially insoluble in a developing solvent and the non-exposed regions are soluble in the developing solvent (see column 15, lines 54-58);
- (iv) removing the non-exposed regions of the heated film with the developing solvent to form a patterned film (see column 25, lines 23-30);
- (v) heating the patterned film (see column 17, lines 3-7); and
- (vi) stripping all or a portion of the product of step (v) with an appropriate organic solvent (see column 18, paragraph 3).

The above-mentioned removing step (vi) is described in the document D2 as providing the same advantages as in the present application (see column 18, lines 17-27). The skilled person would therefore regard it as a normal option to include this step in the method described in document D1 in order to solve the problem posed. Therefore, the subject-matter of present claim 1 cannot be considered as involving an inventive step.

The same reasoning applies, *mutatis mutandis*, to claim 2.

Dependent claims 3-10 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows: the features of these claims are disclosed in D1 and/or D2, or are considered as conventional.

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CLAIMS

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(51)

1. A method comprising:

(i) applying a photopatternable silicone composition to a surface of a substrate to form a film, where the photopatternable silicone composition comprises

5 (A) an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule,

(B) an organosilicon compound containing an average of at least two silicon-bonded hydrogen atoms per molecule in a concentration sufficient to cure the composition, and

(C) a catalytic amount of a photoactivated hydrosilylation catalyst;

10 (ii) exposing a portion of the film to radiation to produce a partially exposed film having non-exposed regions covering at least a portion of the surface and exposed regions covering the remainder of the surface;

(iii) heating the partially exposed film for an amount of time such that the exposed regions are substantially insoluble in a developing solvent and the non-exposed regions are
15 soluble in the developing solvent;

(iv) removing the non-exposed regions of the heated film with the developing solvent to form a patterned film;

(v) heating the patterned film; and

(vi) removing all or a portion of the product of step (v) using an etching solution.
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2. A method comprising:

(i) applying a photopatternable silicone composition to a surface of a substrate to form a film, where the photopatternable silicone composition comprises

25 (A) an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule,

(B) an organosilicon compound containing an average of at least two silicon-bonded hydrogen atoms per molecule in a concentration sufficient to cure the composition, and

(C) a catalytic amount of a photoactivated hydrosilylation catalyst;

30 (ii) exposing a portion of the film to radiation to produce a partially exposed film having non-exposed regions covering at least a portion of the surface and exposed regions covering the remainder of the surface;

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(iii) heating the partially exposed film for an amount of time such that the exposed regions are substantially insoluble in a developing solvent and the non-exposed regions are soluble in the developing solvent;

5 (iv) removing the non-exposed regions of the heated film with the developing solvent to form a patterned film;

(v) removing all or a portion of the patterned film using an etching solution.

3. The method of claim 1 or claim 2, where the substrate is an active surface of a semiconductor wafer.

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4. The method of claim 1 or claim 2, where the removing step is carried out using an etching solution comprising an organic solvent and a base.

15 5. The method of claim 4, where the etching solution contains no more than 25% water based on the weight of the etching solution.

6. The method of claim 4, where the organic solvent is selected from a monohydric alcohol, a dihydric alcohol, a monoether, a diether, a polar aprotic solvent, and combinations thereof.

20 7. The method of claim 4, where the base is selected from ammonium hydroxide, cesium hydroxide, potassium hydroxide, sodium hydroxide, and combinations thereof.

8. The method of claim 4, where the base is selected from phosphazene, tetraalkyl ammonium hydroxides, and combinations thereof.

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9. The method of claim 1 or claim 2, where the solvent is a monohydric alcohol selected from the group consisting of methanol, ethanol, n-propanol, isopropanol, n-butanol, isobutanol, tert-butanol, and combinations thereof.

30 10. Use of the method of claim 1 or claim 2 for rework, photoresist, or cleaning applications.